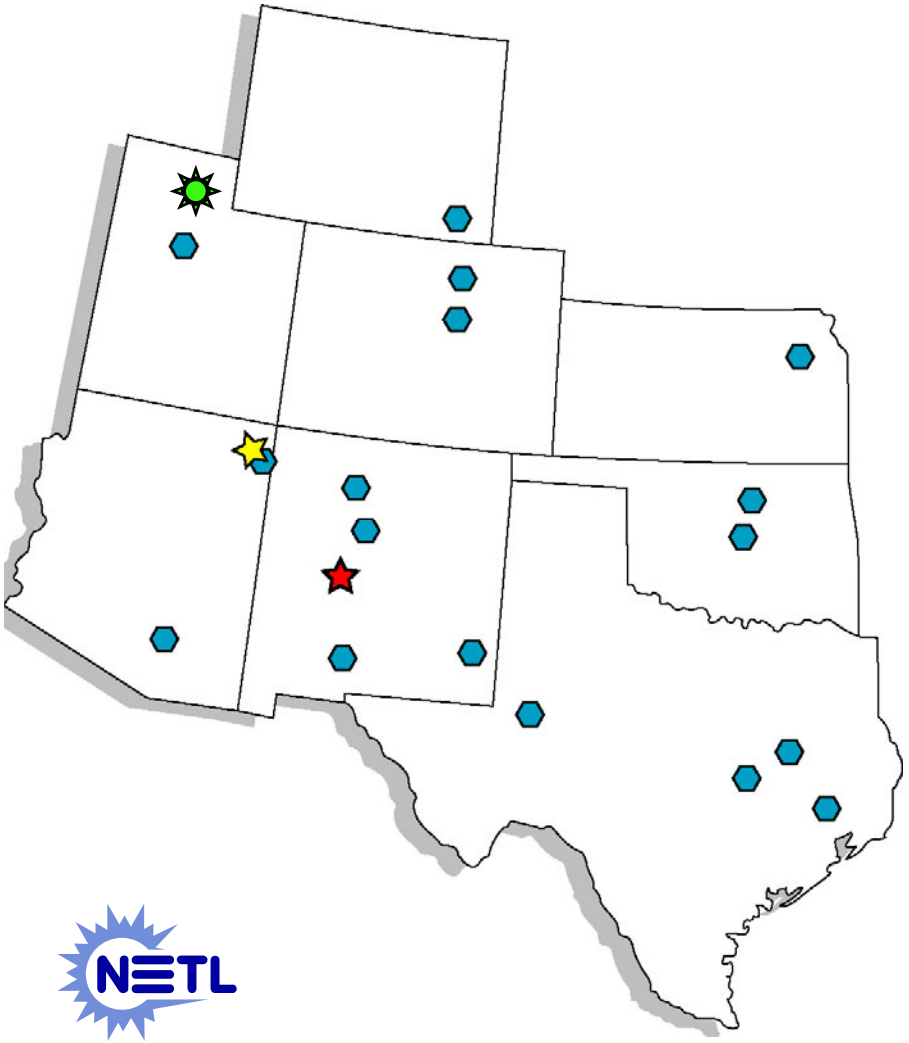
Southwest Regional Partnership on Carbon Sequestration



Southwest Phase II Overview

DE- FC26-05NT42591

May 9, 2007

Pittsburgh, Pennsylvania

Brian McPherson
New Mexico Institute of Mining and Technology
University of Utah

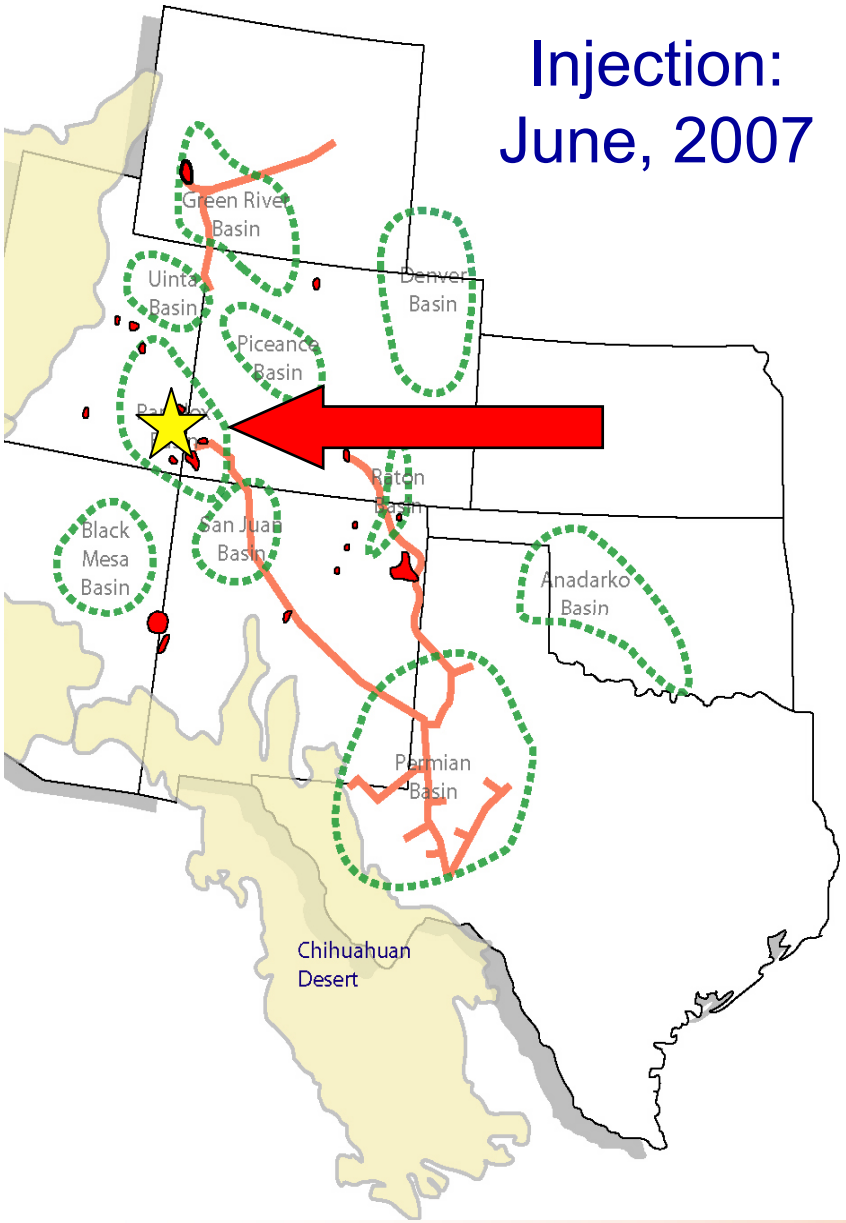
Acknowledgements

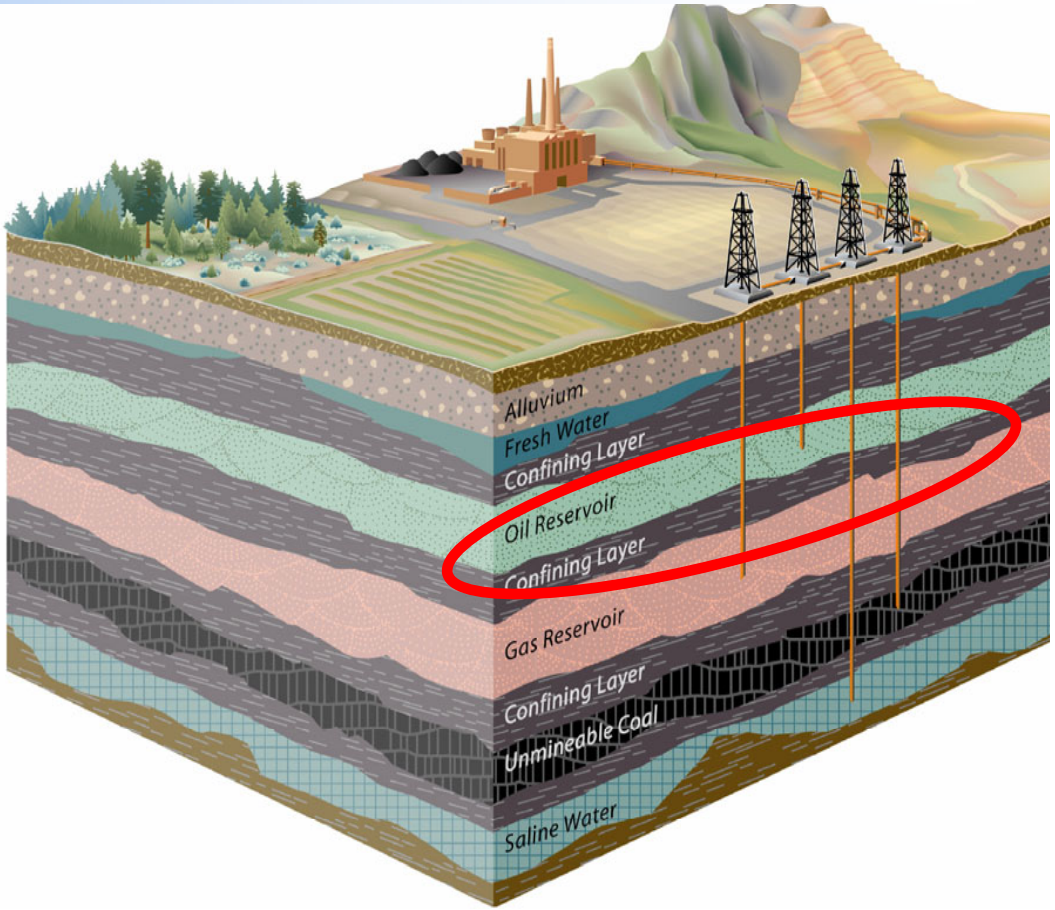
- Many thanks to the U.S. Department of Energy and NETL for supporting this project

- We express our gratitude also to our many industry partners, who have committed a great deal of time, funding and other general support for these projects

- The work presented today is co-authored by all partners in the Southwest Partnership

Southwest Phase II Portfolio



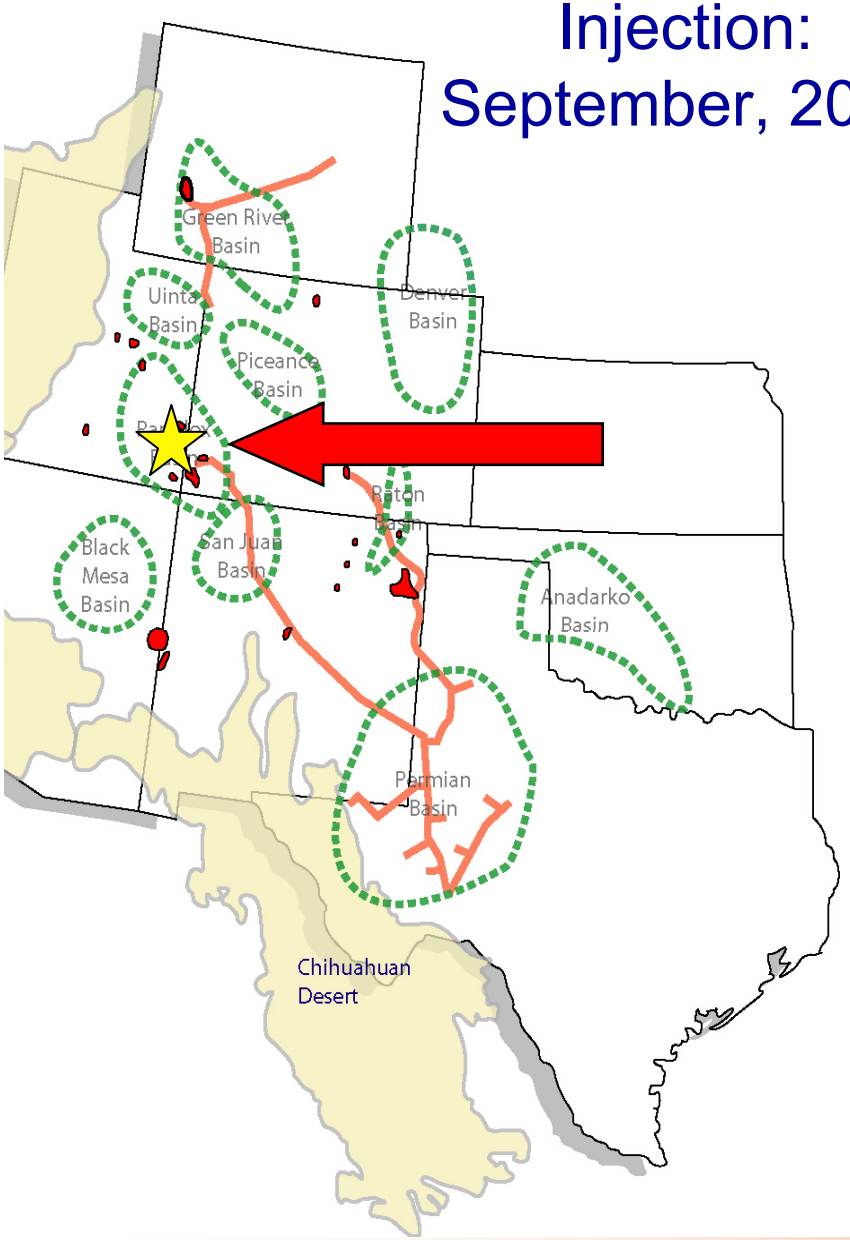


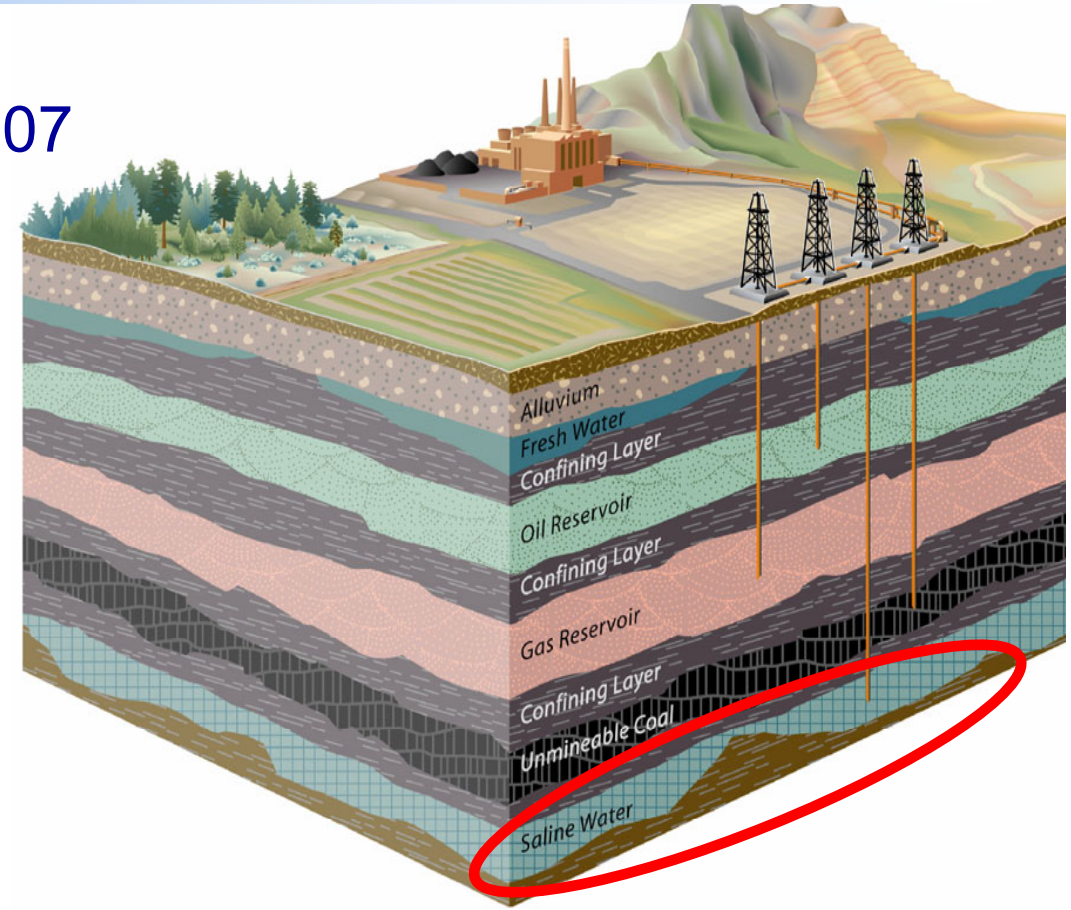
Paradox Basin, Utah: 150,000 tons/year

- **Combined enhanced oil recovery with sequestration and**
- **Deep brine reservoir sequestration testing**

Southwest Phase II Portfolio

Injection:
September, 2007





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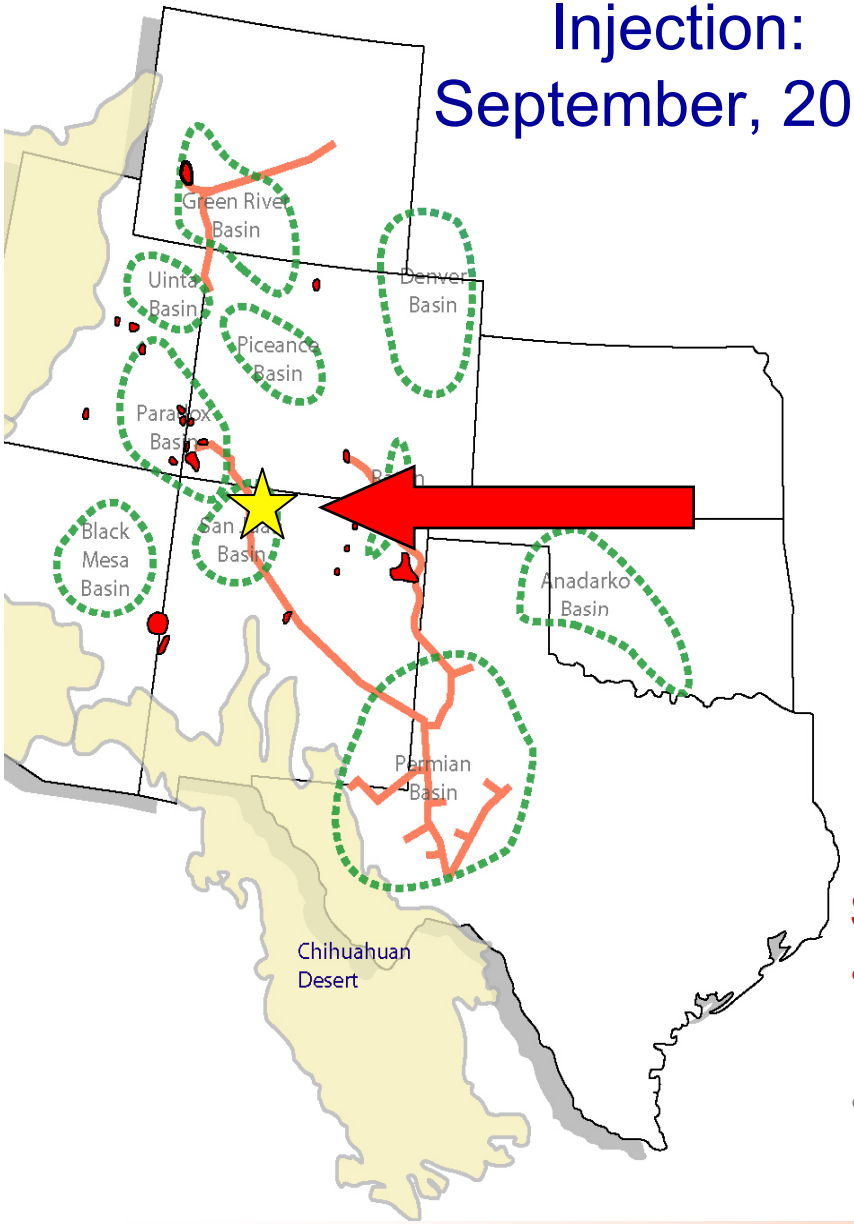
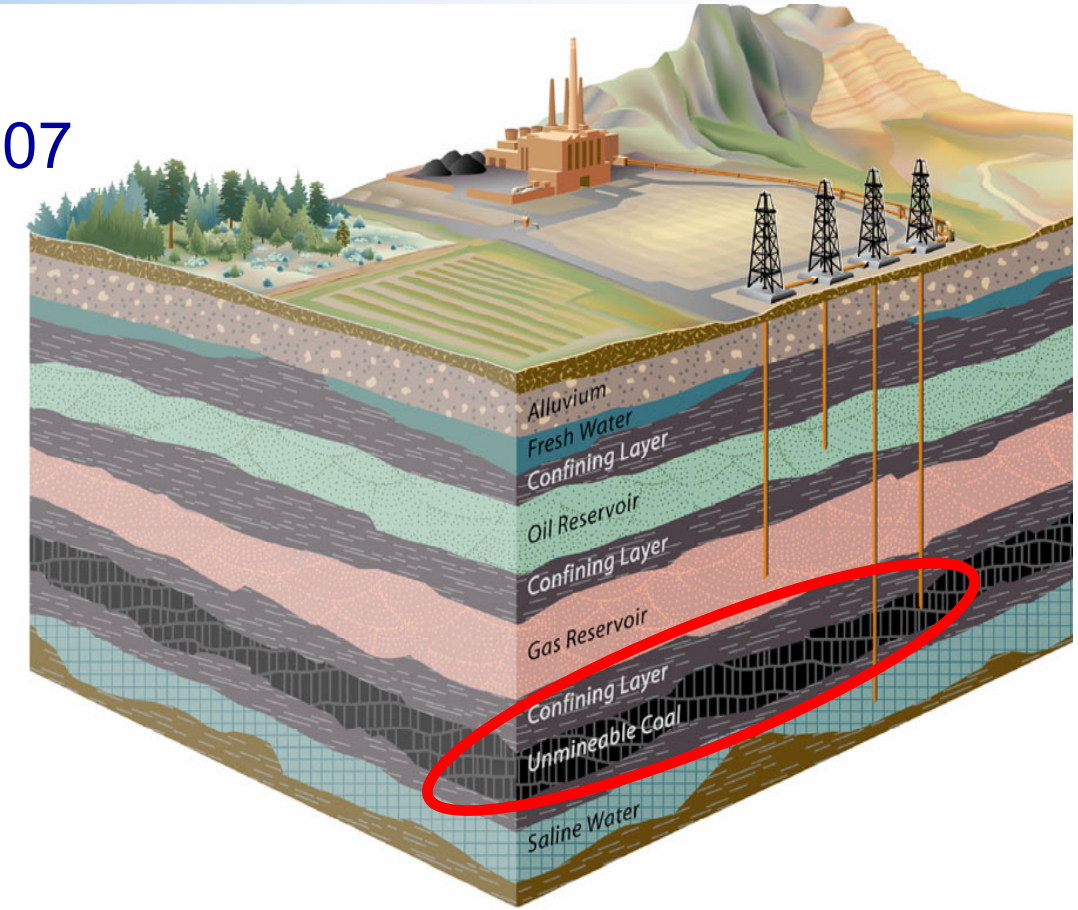


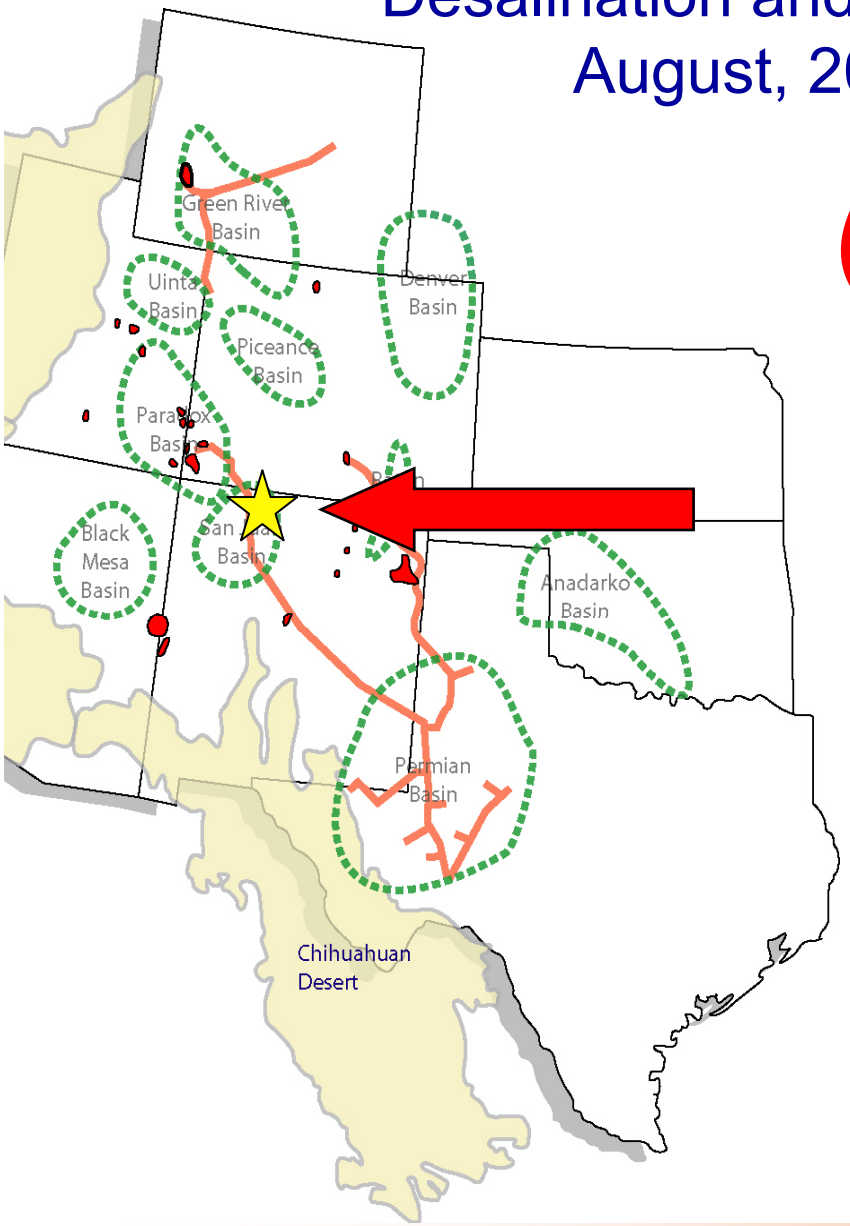


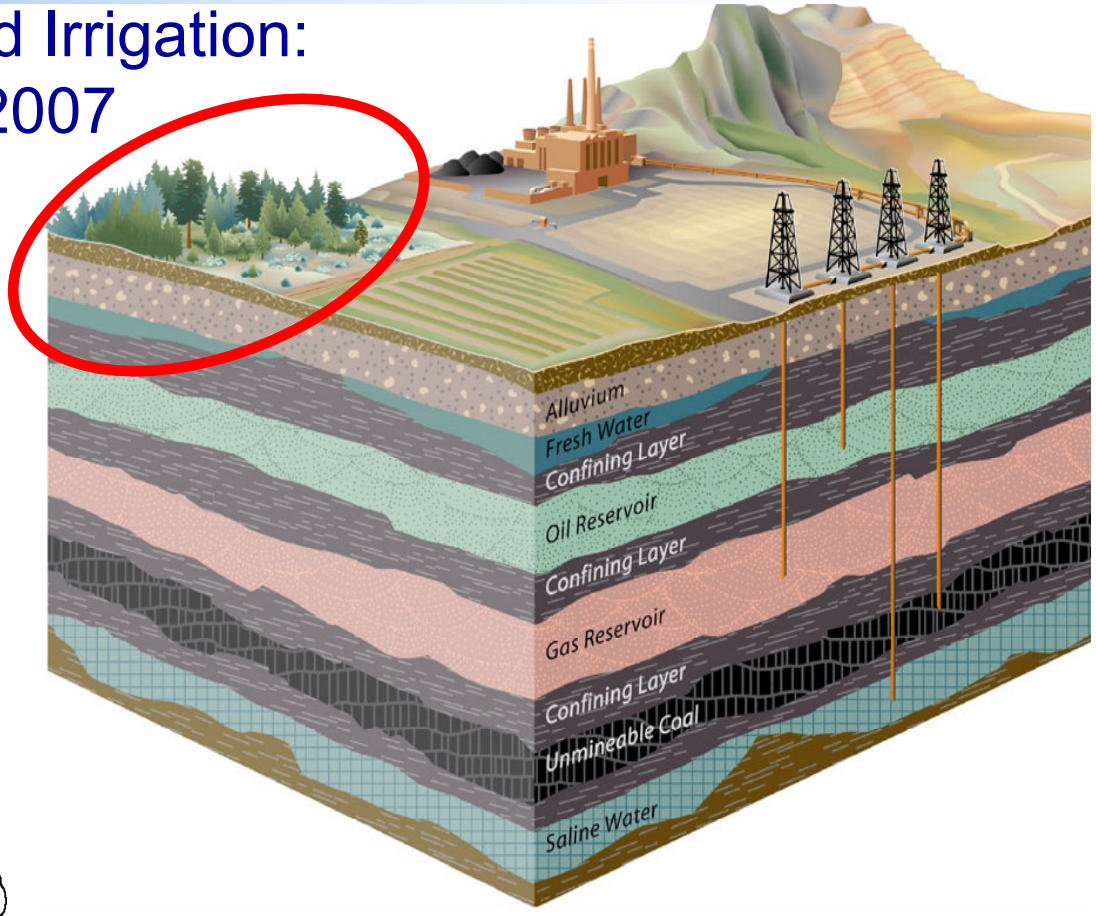
San Juan Basin, NM: 75,000 tons/year

- **Combined enhanced coalbed methane recovery with sequestration**
- **Surface riparian restoration for terrestrial sequestration**

Southwest Phase II Portfolio

Desalination and Irrigation: August, 2007





San Juan Basin, NM: 75,000 tons/year

- Combined enhanced coalbed methane recovery with sequestration
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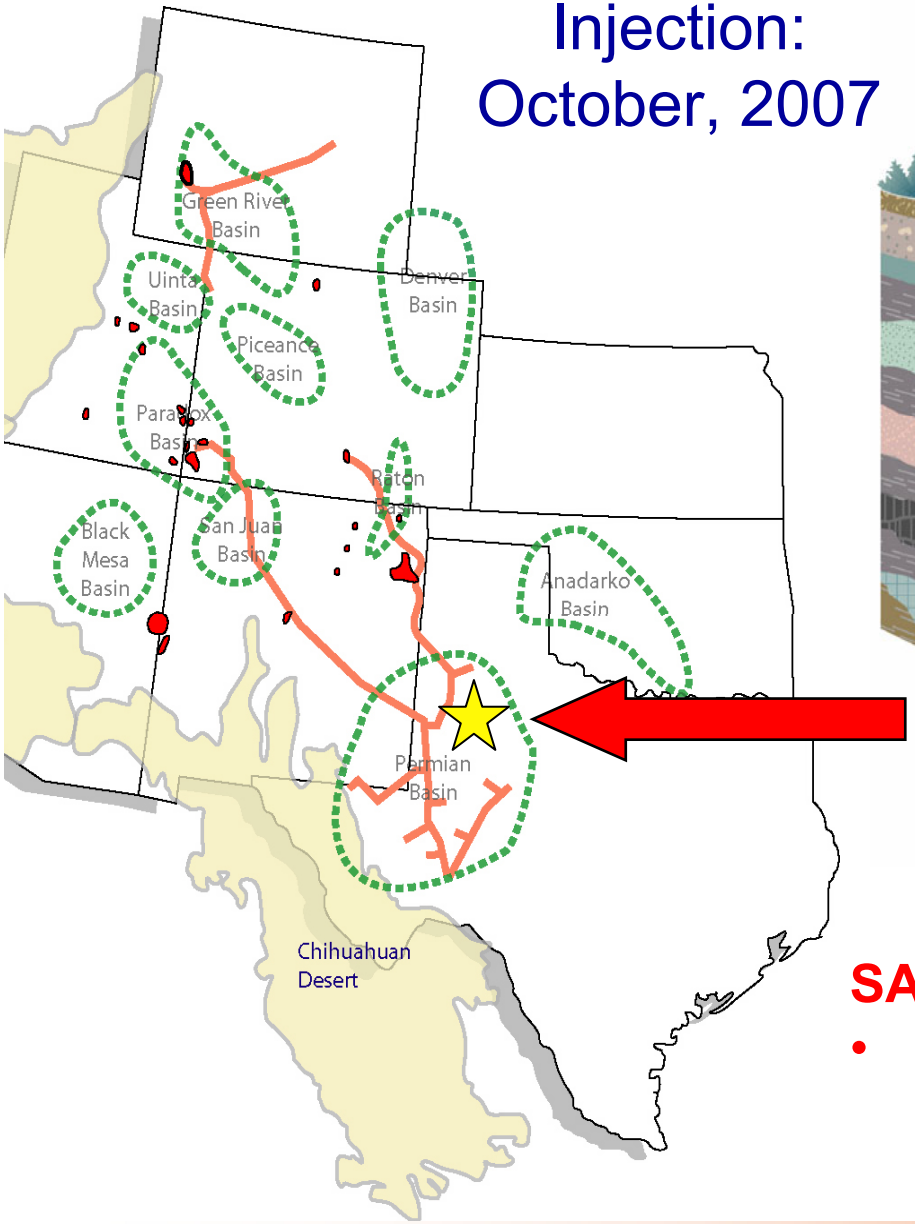
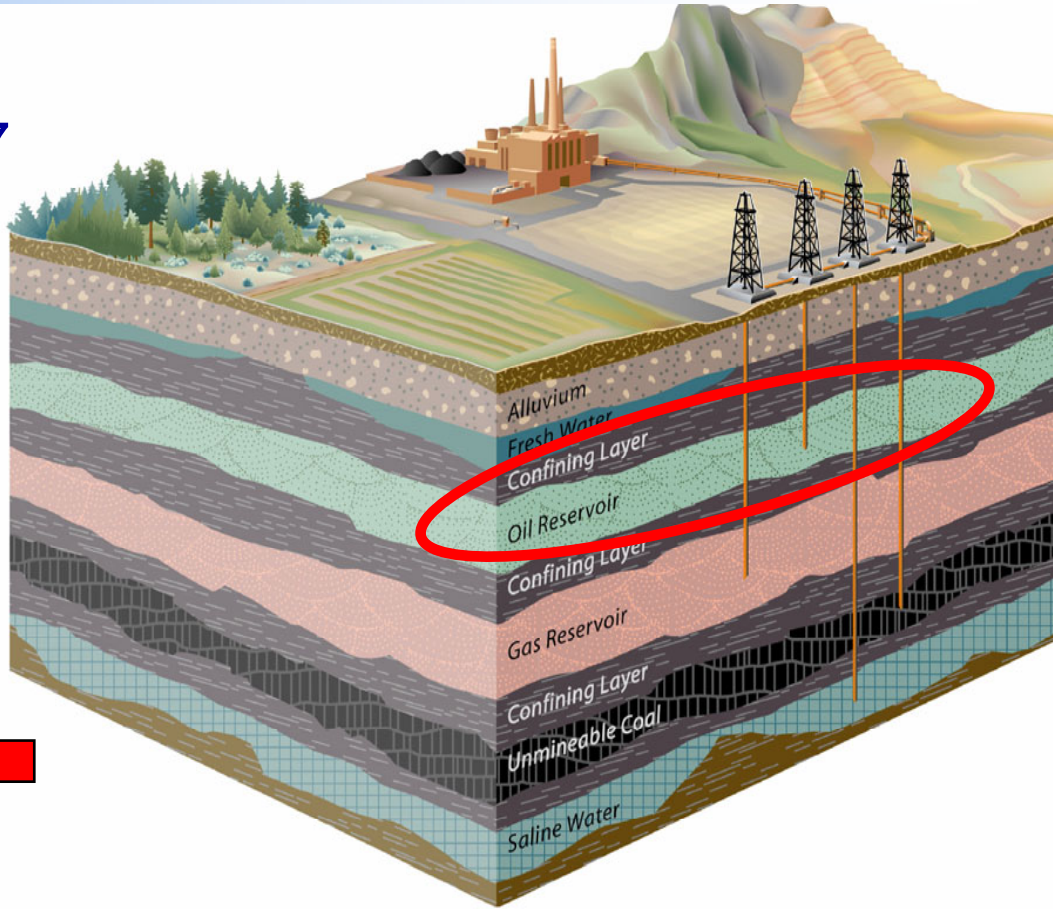
Southwest Phase II Portfolio

Injection:
October, 2007



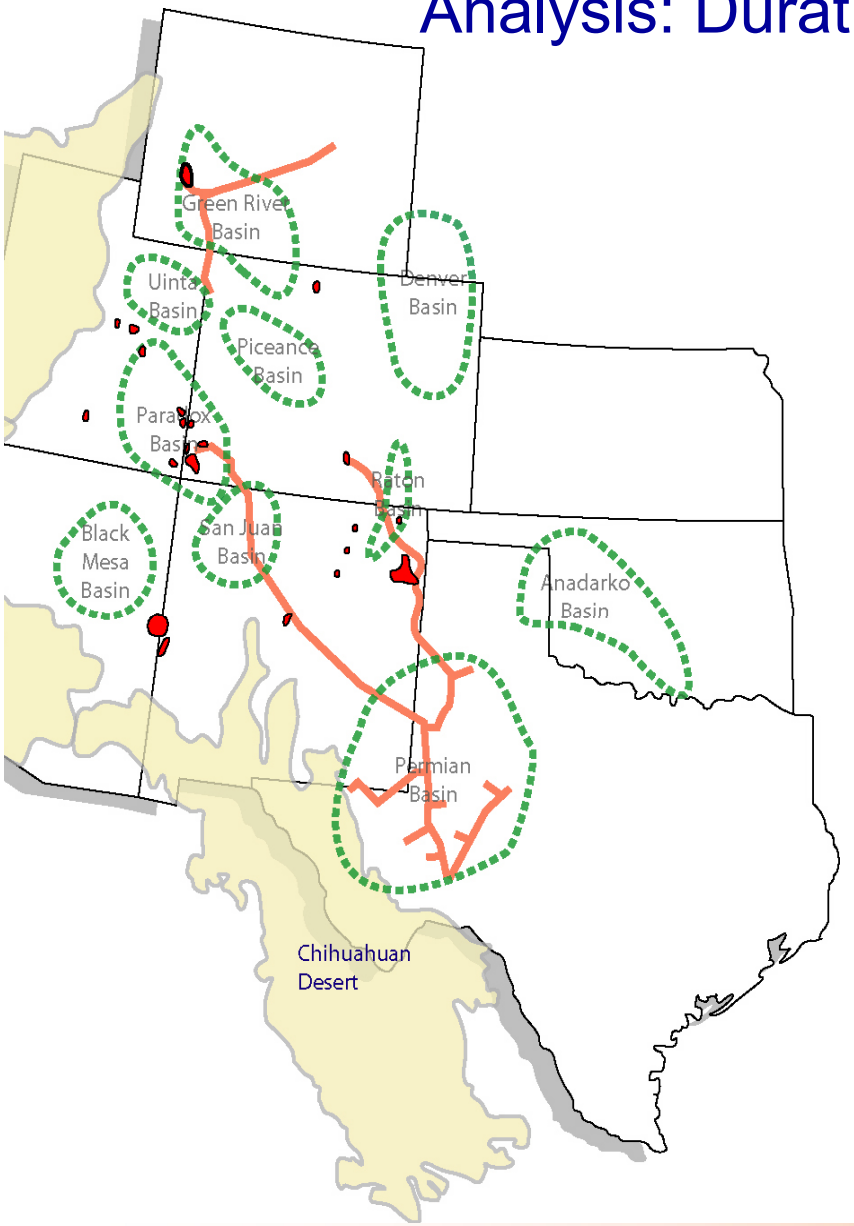


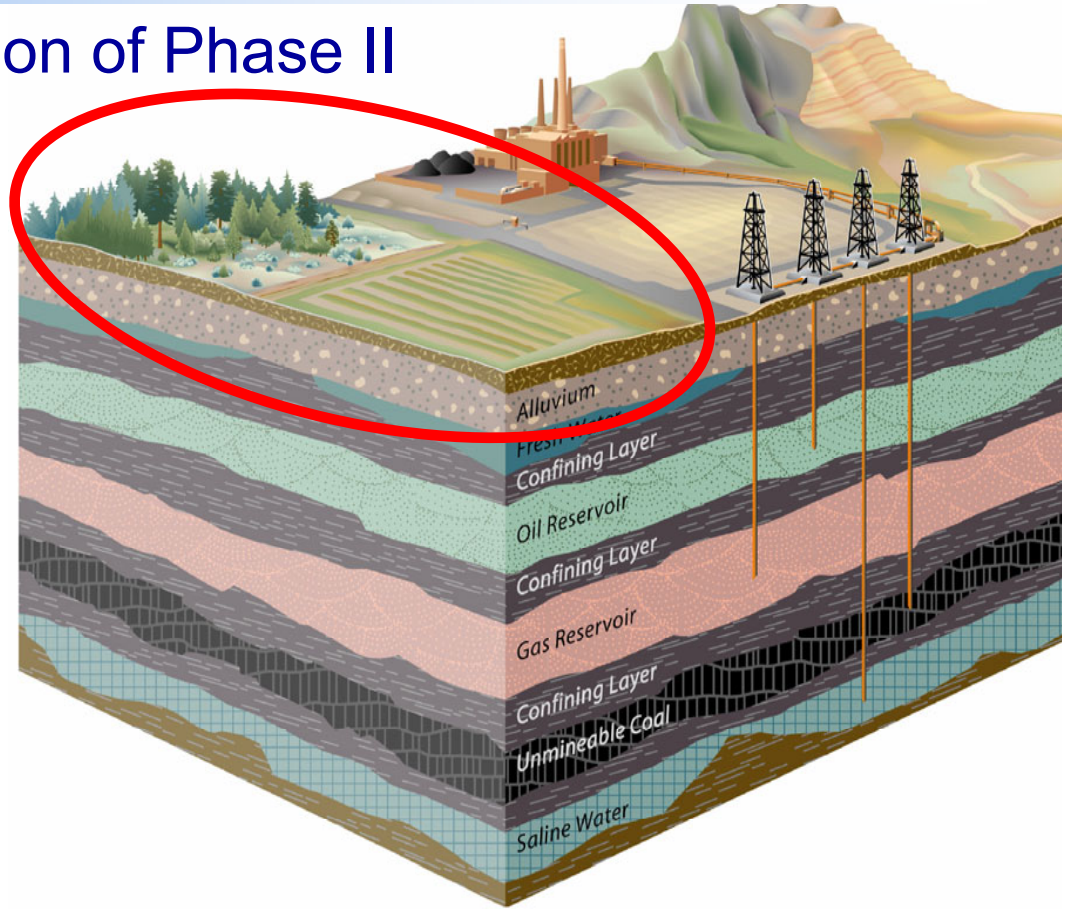
SACROC Unit, Texas: >350,000 tons/year

- **Combined enhanced oil recovery with sequestration**

Southwest Phase II Portfolio

Analysis: Duration of Phase II



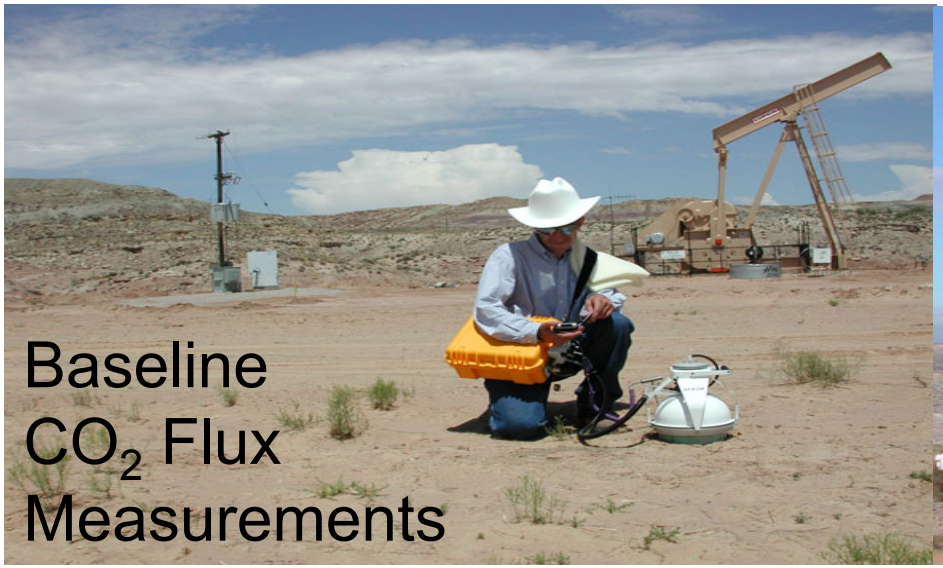


Regional Sequestration Project

- **Land-use and changes**
- **Incentive programs and effects**
- **Improved MMV and reporting**
- **Effects of natural vegetation changes**

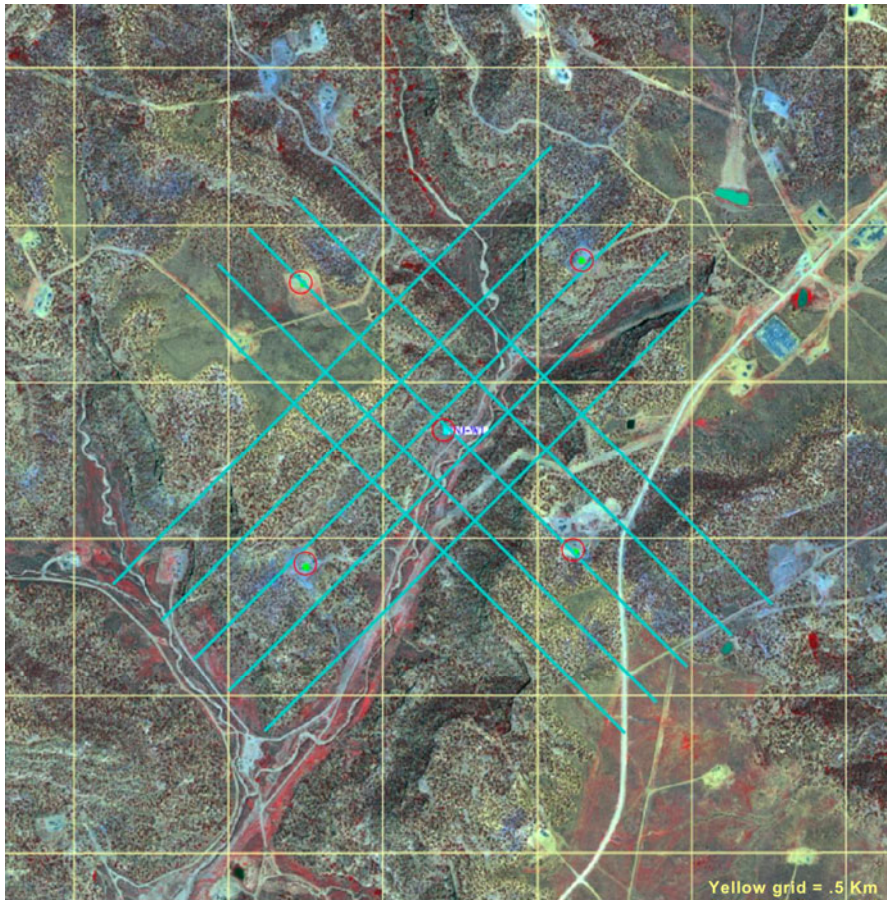
Phase II Progress: Utah Geologic

- *Baseline MMV completed, including*
  - ✓ *3-D seismic survey*
  - ✓ *baseline flux measurements*
  - ✓ *tracer test to begin with injection*
  - ✓ *in situ geophone array for VSP constructed; will be installed later this month*
- *Several delays associated with permitting*
- *Injection will begin in late June, 2007*



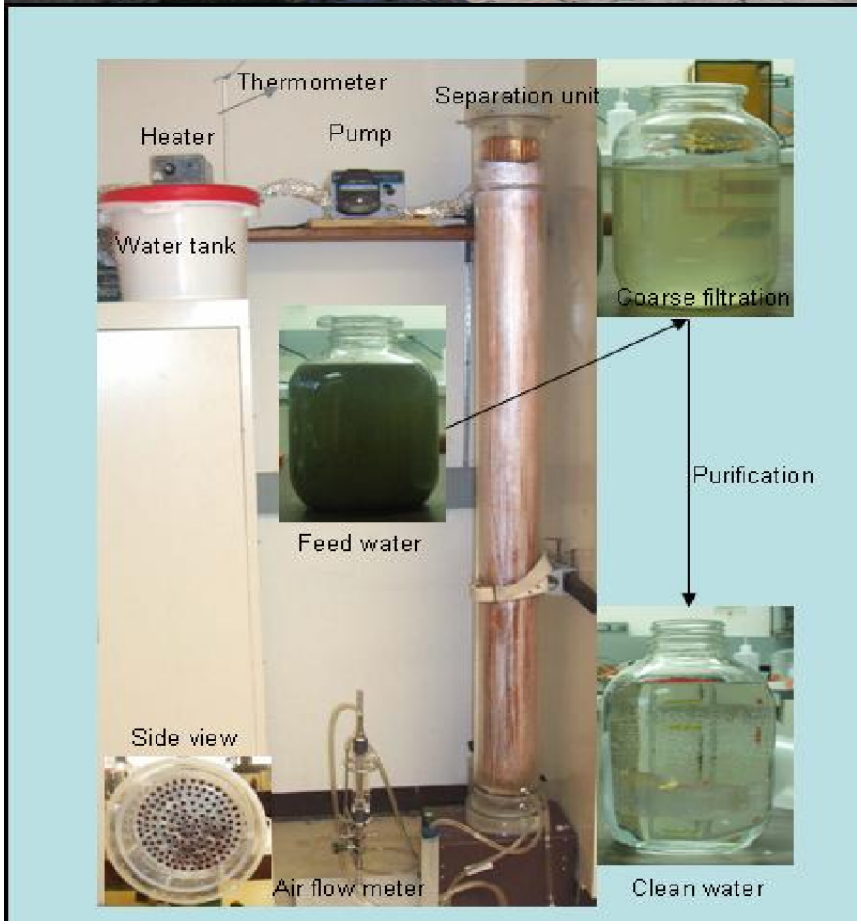
Phase II Progress: New Mexico Geologic

- *Injection well drilling in July*
- *Baseline MMV in progress:*
  - ✓ *2-D seismic survey scheduled for end of June*
  - ✓ *baseline surface flux*
  - ✓ *soil-gas tracers*
  - ✓ *methane/radon surveys*
  - ✓ *groundwater chemistry*
  - ✓ *tiltmeter installation (June)*
- *Injection/reservoir engineering models completed*
- *Injection will begin in late August, 2007*



Phase II Progress: New Mexico Terrestrial

- *Riparian restoration irrigation plans completed*
- *Riparian MMV plans completed*
- *bench-scale humidification-dehumidification desalination unit is completed and produces several gallons/day*
- *a pilot-scale desalination unit is under construction and will be deployed at the San Juan site, to produce 100 gallons/day for irrigation*



Phase II Progress: Texas Geologic Tests

- *Baseline MMV completed, including*
  - ✓ *3-D seismic survey*
  - ✓ *3-D "poor-man's" seismic survey completed*
  - ✓ *baseline fluxes*
  - ✓ *water chemistry and isotopes*
- *High resolution reservoir models completed for capacity, injectivity, and long-term monitoring design*
- *Claytonville test uncertain*
- *New injection and MMV at SACROC will begin summer*

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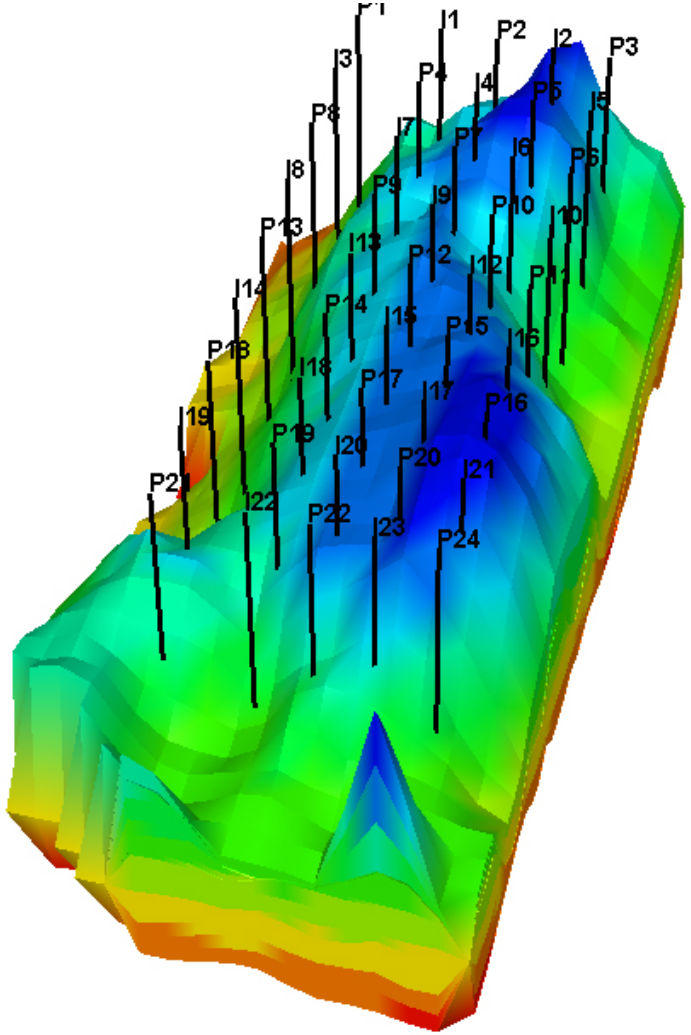
SACROC (north platform)



15,470 elements

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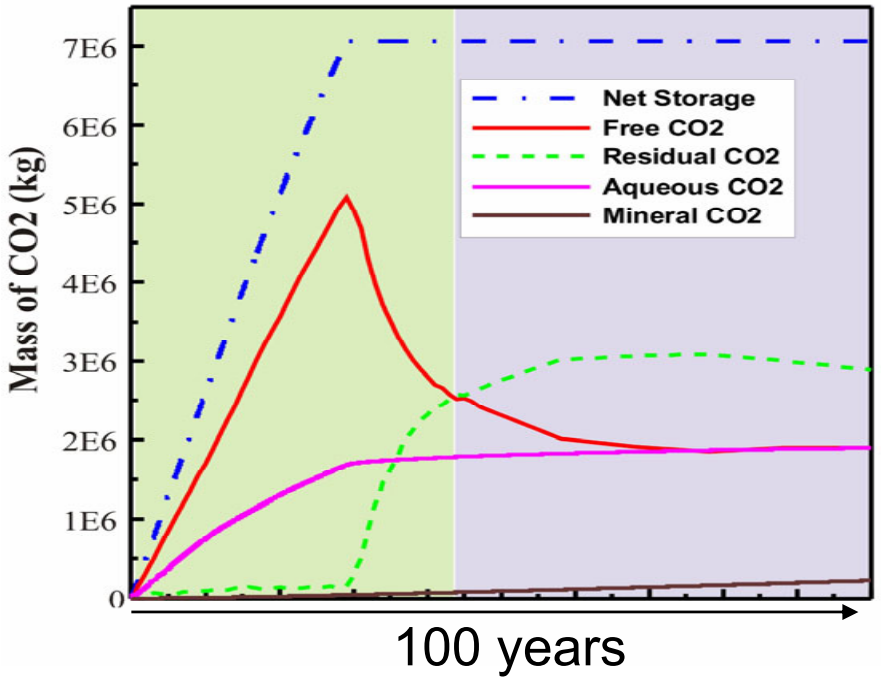
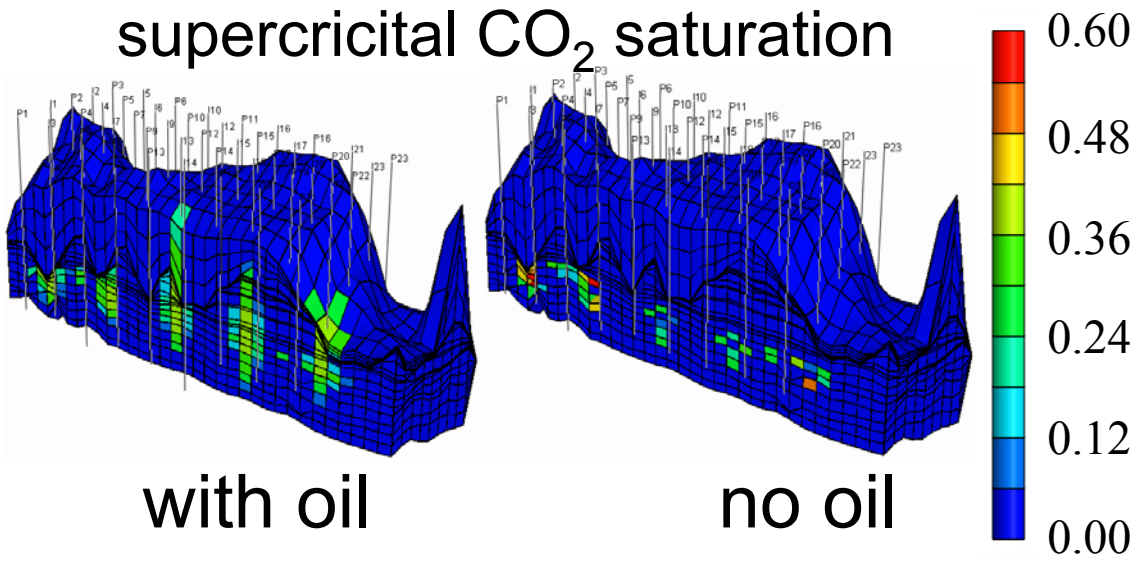




Phase II Progress

Southwestern U.S. Inventory of Sources and Sinks (National Atlas)

<u>Minimum Deep Saline Field Capacities</u>:

Arizona 92 Mtons

Colorado 3.8 Gtons

Kansas 10.6 Gtons

New Mexico 10 Gtons

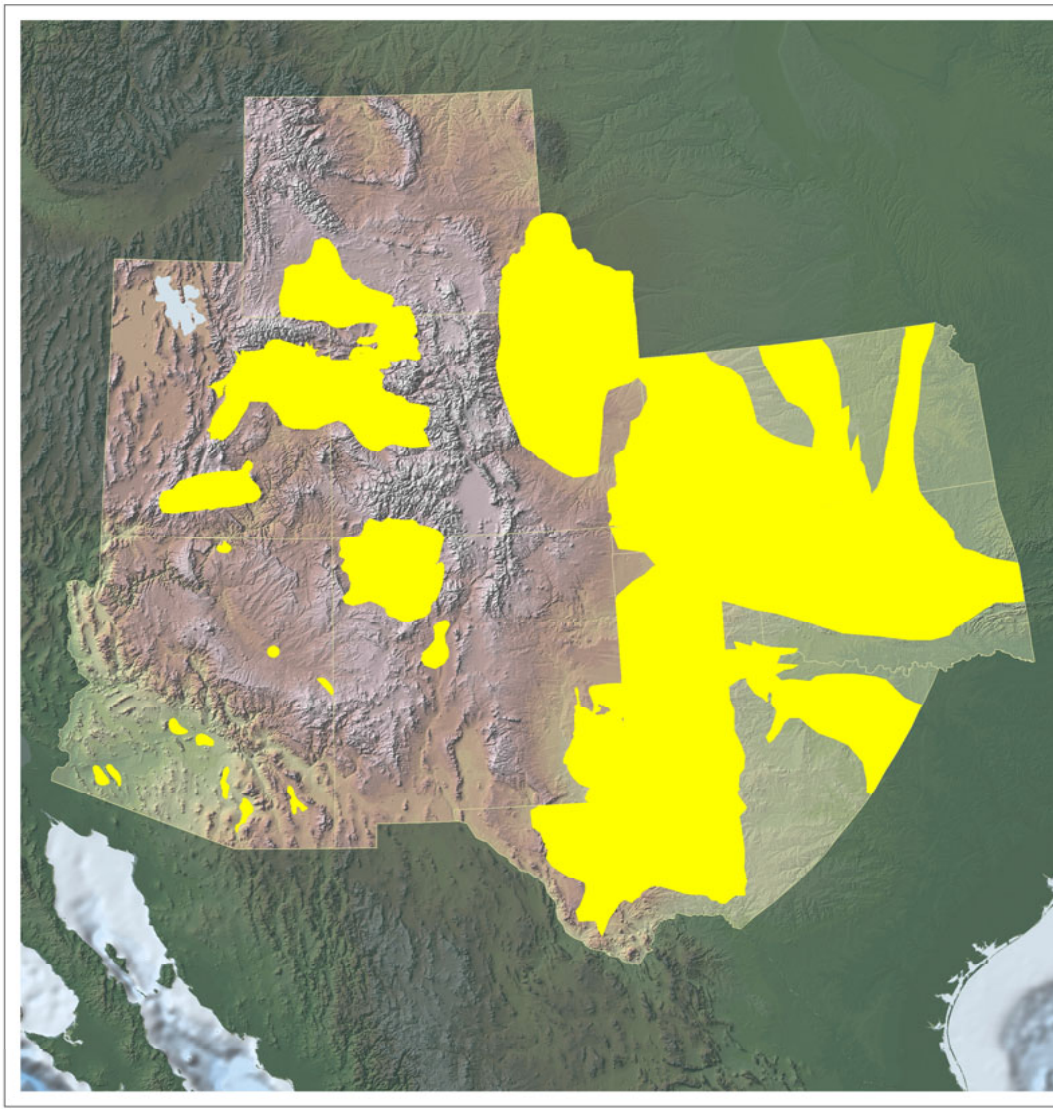
Oklahoma 9 Mtons

Texas 48 Gtons

Utah 508 Mtons

Wyoming 507 Mtons

Southwest Region Saline Formations



Summary and Recommendation

- *Utah and Texas geologic project faced some permitting and otherwise economic delays*
- *New Mexico geologic and terrestrial tests on schedule*
- *Baseline MMV completed or in progress at all sites*
- *New injection at all sites (Utah, New Mexico, and Texas) will begin this summer*
- *Desalination for riparian restoration ready for field*
- *Significant new modeling results (presentation this aft)*
- *New website at http://southwestcarbonpartnership.org*

Summary and Recommendation

A recommendation for sequestration in western states:

The best opportunities are deep saline formations underneath oil and gas fields.

- **in most cases, regulatory requirements are already established**
- **surface and subsurface ownership and mineral & water rights established**
- **the infrastructure of oil and gas fields provides tremendous monitoring options**
- **reduces concerns associated with leakage from abandoned wells, because few wells penetrate these deeper formations**